WHAT IS CLAIMED IS:

1. A composition, comprising:

a first salt of a first metal;

a second salt of a second metal;

a third salt of a rare earth metal,

wherein at least one of the first, second and third salts comprises a trifluoroacetate and the composition has a total free acid concentration of less than about $1x10^{-3}$ molar.

2. The composition of claim 1, wherein the composition has a total free acid concentration of less than about $1x10^{-5}$ molar.

3. The composition of claim 1, wherein the composition has a total free acid concentration of about $1x10^{-7}$ molar.

4. The composition of claim 1, wherein the composition has a mole ratio of fluorine to the second metal of at least about two.

5. The composition of claim 1, wherein the composition has a mole ratio of fluorine to the second metal of from about two to about 18.5.

6. The composition of claim 1, wherein the composition has a mole ratio of fluorine to the second metal of from about two to about 10.

7. The composition of claim 1, wherein the first metal comprises copper and the second metal is selected from the group consisting of barium, strontium and calcium.

8. The composition of claim 7, wherein the rare earth metal comprises yttrium.

9. The composition of claim 1, wherein the first metal comprises copper, the second metal comprises barium and the third metal comprises yttrium.

10. The composition of claim 9, wherein a ratio of copper atoms to barium atoms to yttrium atoms contained in the solution is about 3:2:1.

11. The composition of claim 1, wherein the composition is disposed on a surface of a layer.

12. The composition of claim 11, wherein the layer comprises a material selected from the group consisting of a substrate, a buffer layer and a superconductor layer.

13. The composition of claim 1, further comprising water, wherein the composition has a water content of less than about 50 volume percent.

14. The composition of claim 13, wherein the water content is less than about 35 volume percent.

15. The composition of claim 13, wherein the water content is less than about 25 volume percent.

16. The composition of claim 1, wherein at least two of the first, second and third salts comprises trifluoroacetates.

17. The composition of claim 1, wherein each of the first, second and third salts comprise trifluoroacetates.

18. A composition, comprising:

a first salt of a first metal;

a second salt of a second metal;

a third salt of a rare earth metal,

wherein at least one of the first, second and third salts comprises a trifluoroacetate and the composition has a mole ratio of fluorine to the second metal of from about two to about 18.5.

19. The composition of claim 18, wherein the composition has a mole ratio of fluorine to the second metal of from about two to about 10.

20. The composition of claim 18, wherein the first metal comprises copper and the second metal is selected from the group consisting of barium, strontium and calcium.

21. The composition of claim 20, wherein the rare earth metal comprises yttrium.

22. The composition of claim 18, wherein the first metal comprises copper, the second metal comprises barium and the third metal comprises yttrium.

23. The composition of claim 22, wherein a ratio of copper atoms to barium atoms to yttrium atoms contained in the solution is about 3:2:1.

24. The composition of claim 18, wherein the composition is disposed on a surface of layer.

25. The composition of claim 24, wherein the layer comprises a material selected from the group consisting of a substrate, a buffer layer and a superconductor layer.

26. The composition of claim 18, further comprising water, wherein the composition has a water content of less than about 50 volume percent.

27. The composition of claim 26, wherein the water content is less than about 35 volume percent.

28. The composition of claim 26, wherein the water content is less than about 25 volume percent.

29. The composition of claim 18, wherein at least two of the first, second and third salts comprises trifluoroacetates.

30. The composition of claim 18, wherein each of the first, second and third salts comprise trifluoroacetates.

31. A method, comprising:

combining a first solution with a compound containing a trifluoroacetate group to form a second solution, the first solution comprising a first soluble compound of a first metal, a second soluble compound of a second metal and a third soluble compound of a rare earth metal.

32. The method of claim 31, wherein the amount of the compound is selected so that the second solution has a total free acid concentration of less than about $1x10^{-3}$ molar.

33. The method of claim 31, wherein the amount of the compound is selected so that the second solution has a total free acid concentration of less than about $1x10^{-5}$ molar.

34. The method of claim 31, wherein the amount of the compound is selected so that the second solution has a total free acid concentration of less than about $1x10^{-7}$ molar.

35. The method of claim 31, wherein the amount of the compound combined with the first solution is selected so that the second solution has a mole ratio of fluorine to the second metal of at least about two.

36. The method of claim 31, wherein the amount of the compound combined with the first solution is selected so that the second solution has a mole ratio of fluorine to the second metal of from about two to about 18.5.

37. The method of claim 31, wherein the amount of the compound combined with the first solution is selected so that the second solution has a mole ratio of fluorine to the second metal of from about two to about 10.

38. The method of claim 31, wherein the first metal comprises copper and the second metal is selected from the group consisting of barium, strontium and calcium.

39. The method of claim 38, wherein the rare earth metal comprises yttrium.

40. The method of claim 31, wherein the method is performed without refluxing the first solution or the second solution.

41. The method of claim 31, wherein the second solution comprises a salt of at least one of the rare earth, first and second metals.

42. The method of claim 31, wherein the second solution comprises a salt of at least two of the rare earth, first and second metals.

43. The method of claim 31, wherein the second solution comprises a salt of each of the rare earth, first and second metals.

44. The method of claim 31, wherein the compound comprises trifluoroacetic acid.

45. A method, comprising:

combining with a solvent a first compound of a first metal, a second compound of a second metal and a third compound of a rare earth metal to form a solution, the first, second and third compounds being soluble in the solvent,

wherein at least one of the first, second and third compounds comprises a trifluoroacetate salt.

46. The method of claim 45, wherein the amount of the trifluoroacetate salt is selected so that the solution has a total free acid concentration of less than about $1x10^{-3}$ molar.

47. The method of claim 45, wherein the amount of the trifluoroacetate salt is selected so that the solution has a total free acid concentration of less than about $1x10^{-5}$ molar.

48. The method of claim 45, wherein the amount of the at least one trifluoroacetate salt is selected so that the solution has a total free acid concentration of less than about $1x10^{-7}$ molar.

49. The method of claim 45, wherein the amount of the at least one trifluoroacetate salt is selected so that the solution has a mole ratio of fluorine to the second metal of at least about two.

50. The method of claim 45, wherein the amount of the at least one trifluoroacetate salt is selected so that the solution has a mole ratio of fluorine to the second metal of from about two to about 18.5.

51. The method of claim 45, wherein the amount of the compound combined with the first solution is selected so that the second solution has a mole ratio of fluorine to the second metal of from about two to about 10.

52. The method of claim 45, wherein the first metal comprises copper and the second metal is selected from the group consisting of barium, strontium and calcium.

53. The method of claim 52, wherein the rare earth metal comprises yttrium.

54. The method of claim 45, wherein the method is performed without refluxing the solution.

55. The method of claim 45, wherein the solution comprises a trifluoroacetate of at least two of the rare earth, first and second metals.

56. The method of claim 45, wherein the solution comprises a trifluoroacetate of each of the rare earth, first and second metals.

57. A multi-layer article, comprising:

a first superconductor material layer having a surface; and

a second superconductor material layer disposed on the surface of the first superconductor material layer.

58. The multi-layer article of claim 57, wherein the first and second superconductor material layers have a combined thickness of at least about one micron and a critical current density of at least about $5x10^5$ Amperes per square centimeter.

59. The multi-layer article of claim 58, wherein the combined thickness is at least about two microns.

60. The multi-layer article of claim 58, wherein the combined thickness is at least about three microns.

61. The multi-layer article of claim 58, wherein the combined thickness is at least about four microns.

62. The multi-layer article of claim 58, wherein the combined thickness is at least about five microns.

63. The multi-layer article of claim 58, wherein the combined thickness is at least about six microns.

64. The multi-layer article of claim 58, wherein the critical current density is at least about $1x10^6$ Amperes per square centimeter.

70. The multi-layer article of claim 58, wherein the critical current density is at least about $2x10^6$ Amperes per square centimeter.

71. A method of making a multi-layer article, comprising:

coating a precursor solution of a second superconductor material on a surface of a first superconductor material; and

treating the precursor solution of the second superconductor material to form a layer of the second superconductor material disposed on the surface of the first superconductor material.

72. The method of claim 71, wherein the first and second superconductor material layers have a combined thickness of at least about one micron and a critical current density of at least about $5x10^5$ Amperes per square centimeter.

73. The method of claim 71, wherein the combined thickness is at least about two microns.

74. The method of claim 71, wherein the combined thickness is at least about three microns.

75. The method of claim 71, wherein the combined thickness is at least about four microns.

76. The method of claim 71, wherein the combined thickness is at least about five microns.

77. The method of claim 71, wherein the combined thickness is at least about six microns.

78. The method of claim 72, wherein the critical current density is at least about $1x10^6$ Amperes per square centimeter.

79. The method of claim 72, wherein the critical current density is at least about $2x10^6$ Amperes per square centimeter.

80. An article, comprising:

a first layer of superconductor material; and

a second layer of superconductor material different than the first layer of superconductor material.

81. The article of claim 80, wherein first layer of superconductor material has a thickness of less than about 0.5 micron.

82. The article of claim 80, wherein first layer of superconductor material has a thickness of less than about 0.2 micron.

83. The article of claim 80, wherein first layer of superconductor material has a thickness of from about 0.05 micron to about 0.2 micron.

84. The article of claim 80, wherein second layer of superconductor material has a thickness of at least about one micron.

85. The article of claim 84, wherein second layer of superconductor material has a thickness of at less than about 10 microns.

86. The article of claim 80, wherein second layer of superconductor material has a thickness of from about 4 microns to about 10 microns.

87. The article of claim 80, wherein a combined thickness of the first and second layers of superconductor material is at least about one micron.

88. The article of claim 80, wherein a combined thickness of the first and second layers of superconductor material is at least about two microns.

89. The article of claim 80, wherein a combined thickness of the first and second layers of superconductor material is at least about four microns.

90. The article of claim 80, wherein a combined thickness of the first and second layers of superconductor material is from about four microns to about 10 microns.

91. The article of claim 80, wherein the first and second layers of superconductor material have a combined critical current density of at least about $5x10^5$ Amperes per square centimeter as determined by transport measurement at 77K in self field using a one microVolt per centimeter criterion.

92. The article of claim 80, wherein the first and second layers of superconductor material have a combined critical current density of at least about $1x10^6$ Amperes per square centimeter as determined by transport measurement at 77K in self field using a one microVolt per centimeter criterion.

93. The article of claim 80, wherein the first and second layers of superconductor material have a combined critical current density of at least about $2x10^6$ Amperes per square centimeter as determined by transport measurement at 77K in self field using a one microVolt per centimeter criterion.

94. The article of claim 80, wherein the second layer of superconductor material is disposed on a surface of the first layer of superconductor material.

95. The article of claim 80, wherein the first and second layers of superconductor material comprise the same superconductor material.

96. The article of claim 95, wherein the same superconductor material comprise a REBCO superconductor material.

97. The article of claim 95, wherein the same superconductor material comprises a YBCO superconductor material.

98. The article of claim 97, wherein the YBCO superconductor material comprises $YBa_2Cu_3O_{7-x}$.

99. The article of claim 80, wherein the first and second layers of superconductor material comprise different superconductor materials.

100. The article of claim 80, further comprising a third layer of superconductor material different than the first and second layers of superconductor material.

101. The article of claim 80, further comprising a substrate.

102. The article of claim 101, further comprising a buffer layer stack.

103. The article of claim 102, wherein the buffer layer stack is disposed on a surface of the substrate, the first layer of superconductor material is disposed on a surface of the buffer layer stack, and the second layer of superconductor material is disposed on a surface of the surface of the first layer of superconductor material.

104. The article of claim 103, wherein the buffer layer stack comprises one buffer layer.

105. The article of claim 104, wherein the buffer layer stack comprises more than one buffer layer.

106. The article of claim 80, further comprising a substrate, wherein the first layer of superconductor material is disposed on a surface of the substrate, and the second layer of superconductor material is disposed on a surface of the first layer of superconductor material.